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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/737,512	12/15/2000	Reiner Eschbach	D/A0114 XER 2 0319	9563

7590 04/07/2005

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EXAMINER

THOMPSON, JAMES A

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/737,512

Applicant(s)

ESCHBACH, REINER

Examiner

James A Thompson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 7 and 10-12 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 15 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 2, filed 03 November 2004, with respect to the objections to the specification in item 1 of the first office action, dated 19 July 2004, have been fully considered and are persuasive. The objections to the specification in item 1 of said first office action have been withdrawn.

2. Applicant's arguments filed 03 November 2004 have been fully considered but they are not persuasive.

Regarding page 5, line 17 to page 6, line 5: Lieberman (US Patent 5,185,671) clearly enhances the original image data, specifically by using a filter to enhance the reflectance component while attenuating the illumination component (column 5, lines 7-10 of Lieberman). In fact, Lieberman goes on to clearly state that "[t]he resultant image will be one having a higher contrast in the original unprocessed image" (column 5, lines 10-12 of Lieberman). Filtering the image signal to enhance the reflectance components and attenuate the illumination components of the original unprocessed image is clearly an enhancement of the original data and not mere adjustments to camera position, lighting, et cetera. Both Lieberman and Aach (US Patent 5,708,693) relate to methods of digital image processing. The teachings of Aach suggest ways in which one of ordinary skill in the art would modify the system and method taught by Lieberman. Further, Applicant is respectfully reminded that the test for obviousness is not whether the features of a secondary reference may be bodily

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incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Regarding page 6, line 6 to page 7, line 1: Lieberman and Aach, *by combination*, fully teach each and every limitation of claim 7, as discussed below in item 4 and in the arguments regarding claims 7, 8 and 9 (since the current claim 7 combines original claims 7, 8 and 9) in items 3 and 5 of said first office action. The further included limitation of "deriving enhanced data that represent an enhanced version of said input image..." is discussed below in item 4. The limitation "removing the effect of said lightsource data from the input data" is a limitation found in the original claim 7 and is therefore discussed in item 3 of said first office action and below in the present office action.

Regarding page 7, lines 3-12: In response to applicant's argument that "the method is performed in a xerographic or other non-impact printing/copying environment", a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967)

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and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963).

Regarding page 7, line 14 to page 8, line 11: Lieberman in combination with Aach disclose each and every limitation of claim 7. Lieberman alone, while different from the specific limitations recited in claim 7, does teach fully each and every limitation of claim 7 when combined with the teachings of Aach. Again, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Regarding page 8, lines 13-24: Lieberman in view of Aach further teach all of the limitations of claim 10-12, as discussed in detail below and in item 5 of said first office action.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieberman (US Patent 5,185,671) in view of Aach (US Patent 5,708,693).

Regarding claim 7: Lieberman discloses receiving input data that define an input image (column 3, lines 20-25 of Lieberman) that exhibits uneven exposure (column 5, lines 1-4 of Lieberman); deriving from said input data ($i(x',y')$) lightsource data ($E(x',y')$) that represent an image of a lightsource in said input image (column 3, lines 37-43 of Lieberman); and deriving enhanced data that represent an enhanced version of said input image (column 5, lines 7-12 of Lieberman), said enhanced data obtained by removing the effect of said lightsource data from the input data (column 4, lines 62-65 of Lieberman).

Further, Lieberman discloses that said lightsource data is in the low spatial frequency region (column 4, lines 65-67 of Lieberman); performing a Fourier transform operation on said image data to define said image data in a frequency domain (figure 3(52) and column 4, lines 6-9 of Lieberman); applying a homomorphic filter to said image data (figure 3(54) and column 4, lines 9-14 of Lieberman); and performing an inverse of said Fourier transform operation on said homomorphically-filtered image data to define said homomorphically-filtered image data in a spatial domain (figure 3(56) and column 4, lines 17-19 of Lieberman).

Lieberman does not disclose expressly that said step of deriving lightsource data comprises subsampling said input data to obtain subsampled data defining a subsampled image; low-pass filtering said subsampled data; and upsampling said low-pass filtered data to derive said lightsource data that define a full-scale image of said lightsource. Further, Lieberman does

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not disclose expressly that said step of low-pass filtering comprises performing a Fourier transform operation on said subsampled data to define said subsampled data in a frequency domain; low-pass filtering said subsampled data in the frequency domain; and performing an inverse of said Fourier transform operation on said low-pass filtered subsampled data to define said low-pass subsampled data in a spatial domain.

Aach discloses subsampling input data to obtain subsampled data defining a subsampled image (column 7, lines 54-56 of Aach); and low-pass filtering said subsampled data (column 7, lines 51-55 of Aach). Aach discloses low-pass down-sampling filters (figure 2(101,102) of Aach) which perform both the low-pass filtering and down-sampling operations (column 7, lines 51-55 of Aach) to provide a low-pass down-sampled signal (column 7, lines 55-56 of Aach). Aach does not explicitly state which operation occurs first, but states that both occur (column 7, lines 51-55 of Aach). In fact, performing either low-pass filtering and then down-sampling or down-sampling and then low-pass filtering will achieve the same result since down-sampling will not affect the low-frequency nature of the illumination. Hence, low-pass filtering and down-sampling are independent of each other and can be performed in either order.

Aach further discloses upsampling said low-pass filtered data (column 7, lines 56-60 of Aach).

Lieberman and Aach are combinable because they are from the same field of endeavor, namely image data processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the method of Aach, namely down-sampling, low-pass filtering, and then up-sampling with an interpolator, on said lightsource data taught by Lieberman.

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This will result in the derivation of said lightsource data that define a full-scale image of said lightsource. The motivation for doing so would have been to reduce the level of noise in the overall image while preserving small details of said image (column 1, lines 65-67 of Aach). Further, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to sub-sample the image data before low-pass filtering, as taught by Aach, which would result in the use of a low-pass filter instead of the specific homomorphic filter taught by Lieberman. Since sub-sampling the image data occurs before the low-pass filtering, the Fourier transform taught by Lieberman would be performed on sub-sampled image data and the inverse Fourier transform would be performed on low-pass filtered sub-sampled data. The motivation for doing so would have been to reduce the level of noise in the overall image while preserving small details of said image (column 1, lines 65-67 of Aach). Therefore, it would have been obvious to combine Aach with Lieberman to obtain the invention as specified in claim 7.

Regarding claim 10: Lieberman discloses that said step of deriving enhanced data comprises subtracting said lightsource data from said input data (column 4, lines 28-34 and lines 60-63 of Lieberman). A linear filter is used to remove the illumination components (column 4, lines 60-63 of Lieberman) which are expressed in a linear form after logarithmic conversion to the density domain (column 4, lines 28-34 of Lieberman). In order to filter the illumination component ($\ln[E(x',y')]$) in the logarithmic form (column 4, equation 4 of Lieberman), said illumination component would have to be subtracted from said input data ($\ln[i(x',y')]$).

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Further regarding claim 11: Subtracting said lightsource data from said input data in the density domain, said density domain relation expressed in equation 4 in column 4 of Lieberman, is the same as dividing said input data by said lightsource data in the reflectance domain, said reflectance domain relation expressed in equation 2 in column 3 of Lieberman.

Regarding claim 12: Lieberman does not disclose expressly that said step of upsampling said low-pass filtered data to derive said lightsource data that define a full-scale image of said lightsource comprises interpolating said low-pass filtered data using a linear interpolating method.

Aach discloses interpolating said low-pass filtered data using a linear interpolating method (column 7, lines 56-63 of Aach).

Lieberman and Aach are combinable because they are from the same field of endeavor, namely image data processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to interpolate low-pass filtered data as part of the step of upsampling. The motivation for doing so would have been to smooth the up-sampled data (column 7, lines 62-63 of Aach) instead of simply using 2x2 blocks of the same pixel values. Therefore, it would have been obvious to combine Aach with Lieberman to obtain the invention as specified in claim 12.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is

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reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A Thompson whose telephone number is 703-305-6329. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703-308-7452. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson
Examiner
Art Unit 2624

JAT
28 March 2005



THOMAS D.
~~THOMAS D.~~ LEE
PRIMARY EXAMINER